WHAT IS CLAIMED IS:

1. An apparatus for combining light comprises: at least two laser light sources (1, 2), each of which defining a light beam (12, 13) wherein the light from the laser light sources (1, 2) has at least approximately the same wavelength; and that at least one beam combining unit (11) which combines the light beams (12, 13) at least largely lossless, wherein the combination of the light beams (12, 13) is accomplished with reference to at least one characteristic property of the light beams (12, 13).

2. The apparatus as defined in Claim 1, characterized in that polarization is the characteristic property of the light beams .

3. The apparatus as defined in Claim 2, characterized in that a polarization beam splitter, preferably a Glan-Thompson prism, is provided as the beam combining unit (11).

4. The apparatus as defined in Claim 3, characterized in that the polarization beam splitter (11) combines light beams (12, 13) each having a polarization directions (15, 16) which are substantially perpendicular to one another.

5. The apparatus as defined in Claim 4, characterized in that the polarization direction (16) of the light from the one laser light source (2) is so, that it is deflected by the polarization beam splitter (11); and that the polarization direction (15) of the light from the other laser light source (1) is set so that it passes through the polarization beam splitter (11).

6. The apparatus as defined in Claim 4, characterized in that the polarization beam splitter (11) and a Faraday rotator (17) are arranged between the two light beams (12, 13) from the two laser light sources (1, 2), wherein the light beams (12, 13) proceeding coaxially with one another in opposite directions.

7. The apparatus as defined in Claim 6, characterized in that the polarization direction (15) of the light from the first laser light source (1) is set so that it passes through the polarization beam splitter (11) and the polarization direction (16) of the second laser light source (2) is set so that after passing through the Faraday rotator (17) arranged after the polarization beam splitter (11), it is at least largely parallel to the polarization direction (15) of the light from the first laser light source (1).

8. The apparatus as defined in Claim 1, characterized in that a fiber Y-coupler (19) is provided as the beam combining unit, and the Y-coupler (19) has a non-continuous fiber (20) and a continuous fiber (21).

9. The apparatus as defined in Claim 8, characterized in that the polarization direction (15) of the light from the one laser light source (1) is set so that it is coupled from the non-continuous fiber (20) of the fiber Y-coupler (19) into the continuous fiber (21); and that the polarization direction (16) of the light from the other laser light source (2) is set so that it remains in the continuous fiber (21) of the fiber Y-coupler (19).

10. The apparatus as defined in Claim 1, characterized in that a double-refracting optical element (22) is provided as the beam combining unit.

11. The apparatus as defined in Claim 10, characterized in that the polarization direction (15) of the light from the first laser light source (1) is set so that it at least largely conforms to that of the extraordinary beam of the beam combining unit (22); and that the polarization direction (16) of the light from the second laser light source (2) is set so that it at least largely conforms to that of the ordinary beam of the beam combining unit (22).

12. The apparatus as defined in Claim 1, characterized in that the light sources (1, 2) are pulsed laser light sources (34, 35) defining a pulse profile over

time (36, 37) wherein the pulse profile over time (36, 37) is the characteristic property.

13. The apparatus as defined in Claim 12, characterized in that the beam combining unit is configured as an acousto-optical deflector (AOD) (38) or as an electro-optical deflector (EOD)

14. The apparatus as defined in Claim 12, characterized in that the pulses of the laser light sources (34, 35) are offset in time with respect to one another.

15. The apparatus as defined in Claim 12, characterized in that the individual light pulses are deflected, by a corresponding activation of the AOD or EOD (38), in the direction of a coaxially proceeding light beam (14).

16. The apparatus as defined in Claim 1, characterized in that the characteristic property is defined by an identical numerical aperture (39) of a glass fiber (40).

17. The apparatus as defined in Claim 16, characterized in that the glass fiber (40) is a single-mode fiber.

18. The apparatus as defined in Claim 1, characterized in that a cascaded beam combination of several laser light sources (1, 2, 45) is provided.

19. The apparatus as defined in Claim 18, characterized in that a polarizing glass fiber (42) is provided wherein light in any desired polarization state (15, 16) is linearly polarized.

20. The apparatus as defined in Claim 19, characterized in that combined light (14) from at least two laser light sources (1, 2) is coupled into a polarizing glass fiber (42).

21. The apparatus as defined in Claim 20, characterized in that the light that emerges from the polarizing glass fiber (42) is combined with at least one further light beam (44).

22. The apparatus as defined in claim 19, characterized in that several polarizing fiber Y-couplers (48, 49, 50) are provided in a cascaded form.

23. The apparatus as defined in Claim 20, characterized in that the polarization direction (56) of the third laser light source (45) is set so that it is at least parallel to the polarization direction (18) of the combined light (14) from the first two laser light sources (1, 2) after passing through a second Faraday rotator (55) located after a second polarization beam splitter (54).

24. An apparatus for combining light comprises: a first light source (24), means for dividing the light from the first light source (24) into plurality of partial beams (29), a plurality of laser light sources (25, 26, 27) wherein the light of each partial beam is coupled into the laser light sources (25, 26, 27) wherein the light from the laser light sources (25, 26, 27) has at least approximately the same wavelength; and a plurality of beam combining means (23) which combine the light (30) emitted from the laser light sources (25, 26, 27) at least largely lossless, wherein the combination of the light (30) is accomplished with reference to at least one characteristic property of the light (30).

25. The apparatus as defined in Claim 24, characterized in that phase is provided as the characteristic property of the light (30).

26. The apparatus as defined in Claim 24, characterized in that the beam combining means (23) perform beam combination in accordance with the time reversal of a beam division at an interface or at a beam splitter plate.

27. The apparatus as defined in Claim 24, characterized in that to prevent feedback of light into a laser light source (24), an optical diode (31) is provided.

28. The apparatus as defined in Claim 27, characterized in that the optical diode (31) is embodied as a Faraday rotator, as a Faraday rotator in conjunction with a Glan-Thompson prism, as an acousto-optical modulator (AOM or as an optical circulator

29. The apparatus as defined in Claim 25, characterized in that a phase modification means (32) is placed before and/or after each laser light source (25, 26, 27) for matching the phase of the individual laser light sources (25, 26, 27).

30. A confocal scanning microscope (3) comprises: at least two laser light sources (1, 2), each of which defining a light beam (12, 13) wherein the light from the laser light sources (1, 2) has at least approximately the same wavelength; and that at least one beam combining unit (11) which combines the light beams (12, 13) at least largely lossless, wherein the combination of the light beams (12, 13) is accomplished with reference to at least one characteristic property of the light beams (12, 13).

31. The confocal scanning microscope as defined in Claim 30, characterized in that polarization is the characteristic property of the light beams.

32. The confocal scanning microscope as defined in Claim 31, characterized in that a polarization beam splitter, preferably a Glan-Thompson prism, is provided as the beam combining unit (11).

33. The confocal scanning microscope as defined in Claim 32, characterized in that the polarization beam splitter (11) combines light beams (12, 13) each

having a polarization directions (15, 16) which are substantially perpendicular to one another.

34. The confocal scanning microscope as defined in Claim 33, characterized in that the polarization direction (16) of the light from the one laser light source (2) is so, that it is deflected by the polarization beam splitter (11); and that the polarization direction (15) of the light from the other laser light source (1) is set so that it passes through the polarization beam splitter (11).

35. The confocal scanning microscope as defined in Claim 35, characterized in that a fiber Y-coupler (19) is provided as the beam combining unit, and the Y-coupler (19) has a non-continuous fiber (20) and a continuous fiber (21).

36. The confocal scanning microscope as defined in Claim 35, characterized in that the polarization direction (15) of the light from the one laser light source (1) is set so that it is coupled from the non-continuous fiber (20) of the fiber Y-coupler (19) into the continuous fiber (21); and that the polarization direction (16) of the light from the other laser light source (2) is set so that it remains in the continuous fiber (21) of the fiber Y-coupler (19).

37. The confocal scanning microscope as defined in Claim 30, characterized in that a cascaded beam combination of several laser light sources (1, 2, 45) is provided.

38. The confocal scanning microscope as defined in Claim 37, characterized in that a polarizing glass fiber (42) is provided wherein light in any desired polarization state (15, 16) is linearly polarized.

39. The confocal scanning microscope as defined in Claim 38, characterized in that combined light (14) from at least two laser light sources (1, 2) is coupled into a polarizing glass fiber (42).

40. The confocal scanning microscope as defined in Claim 39, characterized in that the light that emerges from the polarizing glass fiber (42) is combined with at least one further light beam (44).

41. The confocal scanning microscope as defined in claim 40, characterized in that several polarizing fiber Y-couplers (48, 49, 50) are provided in a cascaded form.